

# PATENT ABSTRACTS OF JAPAN

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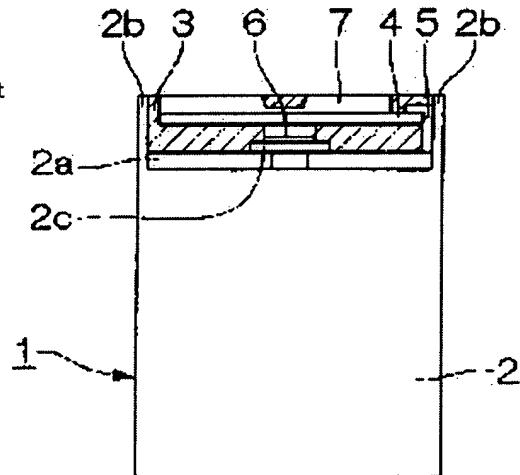
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## (54) BATTERY AND ITS MANUFACTURING METHOD

### (57)Abstract:

**PROBLEM TO BE SOLVED:** To improve reliability and productivity of a battery.

**SOLUTION:** It is the battery 1 which is constituted by integrating to unify the battery cell 2 and a circuit board 4 electrically connected to each terminal of this battery cell 2 by a resin mold part 3 which wraps this circuit board 4. The battery is provided, in which the resin mold part 3 is adhered to a projecting wall part 2b, which is formed by projecting at least one part of the wall of the container, which constitutes the battery cell 2, from one adjoining surface 2a, which adjoins this wall.



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CLAIMS

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## [Claim(s)]

[Claim 1] The dc-battery which it is [ dc-battery ] the dc-battery which comes to unify a battery cell and the circuit board electrically connected to each terminal of this battery cell by the resin mold section which wraps in this circuit board, and made some walls [ at least ] of the container which constitutes a battery cell project from one adjoining front face which adjoins this wall and which it projected and the resin mold section has stuck to the wall.

[Claim 2] The dc-battery according to claim 1 formed in the location where said protrusion wall counters across said adjoining front face two places.

[Claim 3] The dc-battery according to claim 1 or 2 with which said protrusion wall is prepared in the perimeter on said front face of adjoining over the perimeter.

[Claim 4] The manufacture approach of a dc-battery of pouring in and stiffening melting resin in the cavity which is the manufacture approach of a dc-battery given in either of claim 1 to claims 3, and demarcated said circuit board around the circuit board in the condition of having connected with each terminal of said battery cell electrically, using said adjoining front face and said protrusion wall.

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## DETAILED DESCRIPTION

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### [Detailed Description of the Invention]

[0001]

[Field of the Invention] Especially this invention relates to the technique which improves the dependability and productivity of a dc-battery about the manufacture approach of a dc-battery and a dc-battery.

[0002]

[Description of the Prior Art] Conventionally, the dc-battery used for personal digital assistants, such as a portable telephone and a personal handy phone machine, is equipped with an abbreviation rectangular parallelepiped-like battery cell and the circuit board electrically connected to each terminal of this battery cell, and there are some which fixed these in one with resin in it.

[0003] Said battery cell is constituted by enclosing with the electrolytic solution what carried out two or more layer laminating of the positive-electrode film separated with the separator in the container which comes to carry out deep drawing of the aluminum material, and the negative-electrode film with an obturation plate. To this obturation plate, a negative-electrode terminal projects in that center, and it is arranged at the condition.

[0004] Said circuit board is a thing for charge control of a battery cell, and electrical protection, and is pasted up on the front face of said battery cell with the double-sided tape. In order to prevent that the thickness of a dc-battery increases the adhesion location to the battery cell of the circuit board, while considering as the side face in which it meets in the thickness direction of a battery cell, in order to secure sufficient adhesion area by the double-sided tape, the flat side face is chosen. Moreover, the circuit board is attached in the side face contiguous to a negative-electrode terminal from the need of connecting with the negative-electrode terminal which projects on one side face of a battery cell.

[0005] Furthermore, the circuit board is connected to each terminal of a battery cell by the metal connection plate. This connection plate is prolonged toward the adjoining negative-electrode terminal and adjoining positive-electrode terminal of a side face, respectively from the both ends of the long and slender circuit board allotted covering the overall length of a battery cell, and connects the circuit board and a battery cell electrically and mechanically by carrying out soldering of each tip to each terminal. Therefore, these connection plate will be arranged so that said battery cell may be held. And the circuit board and the connection plate which were fixed in this way are wrapped in by the resin mold section, and are united with the battery cell.

[0006]

[Problem(s) to be Solved by the Invention] However, with the conventional dc-battery constituted in this way, since the circuit board and a connection plate were arranged on the side face of a battery cell, the front face of a battery cell will be covered with the circuit board or a connection plate, and there was a problem that adhesion area with the resin mold section decreased. For this reason, the resin mold section may drop out according to external force. Moreover, since the resin mold section was fabricated covering three side faces of a battery cell, the battery cell needed to be made buried in the interior of metal mold, and the resin mold section needed to be fabricated. For this reason, the metal mold which has a complicated cavity configuration was used, and there was a problem that the product cost of a dc-battery became high. This invention is made in view of the situation mentioned above, and aims at improvement in the dependability of a dc-battery, and productivity.

[0007]

[Means for Solving the Problem] Invention which relates to claim 1 in order to solve the above-mentioned technical problem is a dc-battery which comes to unify a battery cell and the circuit board electrically connected to each terminal of this battery cell by the resin mold section which wraps in this circuit board , and has proposed the dc-battery which made some walls [ at least ] of the container which constitutes a

battery cell project from one adjoining front face which adjoins this wall and which it projected and the resin mold section has stuck to the wall .

[0008] According to this invention, the adhesion area of a battery cell and the resin mold section can be made to increase, when the front face of a battery cell and the inside of a protrusion wall paste the resin mold section. Moreover, a rigid high protrusion wall can be made to support the side face of the resin mold section. Consequently, the adhesive strength of a battery cell and the resin mold section is increased, and it becomes possible to hold so that the resin mold section's dedropping [ a battery cell to ] may not be found in the resin mold section from the side to this external force.

[0009] Moreover, invention concerning claim 2 has proposed the dc-battery formed in the location where said protrusion wall counters across said adjoining front face two places in a dc-battery according to claim 1. According to this invention, while supporting the resin mold section to the external force applied in the opposite direction of these protrusion wall, the resin mold section inserted into two protrusion walls which counter can project with the resin mold section also to the external force of the direction which intersects perpendicularly with this, can heighten adhesive strength with a wall, and can improve further the installation reinforcement of the resin mold section and a battery cell.

[0010] Moreover, invention concerning claim 3 has proposed the dc-battery with which said protrusion wall is prepared in the perimeter on said front face of adjoining over the perimeter in a dc-battery according to claim 1 or 2. According to this invention, it can project, the side face of the resin mold section can be covered with a wall over the perimeter, and it can prevent that external force joins this side face directly.

[0011] Moreover, invention concerning claim 4 is the manufacture approach of a dc-battery given in either of claim 1 to claims 3, and has proposed the manufacture approach of a dc-battery of pouring in and stiffening melting resin in the cavity which is in the condition electrically connected to each terminal of said battery cell, and demarcated said circuit board around the circuit board using said adjoining front face and said protrusion wall.

[0012] According to this invention, by demarcating a cavity using a protrusion wall, the cavity side formed by metal mold can be lessened, and metal mold can be made simple. Especially the cavity side that should be formed with metal mold if it projects over the perimeter on the front face of adjoining and a wall is formed is set to one, and the metal mold of a simple configuration like the lid which closes tip opening of a protrusion wall can be used instead of the metal mold which wraps in a battery cell.

[0013]

[Embodiment of the Invention] Hereafter, 1 operation gestalt of the dc-battery concerning this invention is explained with reference to drawing 9 from drawing 1 . Drawing 1 is the perspective view showing the appearance of the dc-battery 1 concerning this operation gestalt. A dc-battery 1 is used for personal digital assistants, such as a portable telephone, and is constituted by a battery cell 2 and the resin mold section 3.

[0014] A battery cell 2 is for example, a lithium ion dc-battery, and as shown in drawing 2 , it has the container of the shape of a rectangular parallelepiped made from aluminum and obturation plate 2a by which deep-drawing shaping was carried out. The separator and electrode which are not illustrated are enclosed with the interior of said container with the electrolytic solution. Said obturation plate 2a is a lid-like member for sealing opening of this container.

[0015] It projects in the center section of obturation plate 2a from the front face of this obturation plate 2a, and negative-electrode cap 2c is prepared in it. Negative-electrode cap 2c is electrically insulated to obturation plate 2a. Said obturation plate 2a constitutes one on the front face of a minimum area where projected area is the smallest of the front faces of a battery cell 2.

[0016] Obturation plate 2a was inserted from the opening tip of a container to the location of the predetermined depth, and has sealed the container by carrying out a girth weld to a container there. That is, obturation plate 2a constitutes the adjoining front face which adjoins the container wall surface of a battery cell, and constitutes protrusion wall 2b in which the part from obturation plate 2a to an opening tip projects from an adjoining front face among container side attachment walls. Thus, in the constituted battery cell 2, all the other front faces where negative-electrode cap 2c contained obturation plate 2a and protrusion wall 2b as a negative-electrode terminal function as a positive-electrode terminal, respectively.

[0017] Said resin mold section 3 has wrapped in the circuit board 4 and the connection members 5 and 6, as shown in drawing 2 . The circuit board 4 has the area of extent with which the magnitude of obturation plate 2a of a battery cell 2 is not filled, and carries suitable electronic parts and the connector 7 grade for external connection. These electronic parts are components for performing charge control of a dc-battery 1 etc. Said circuit board 4 is connected to a battery cell 2 through the connection members 5 and 6 while it counters obturation plate 2a of a battery cell 2 and is arranged. Connection terminal 4a and catching hole 4b as shown in drawing 3 are prepared in the circuit board 4. Wiring (illustration abbreviation) led from

said connector 7 grade is connected to connection terminal 4a and catching hole 4b.

[0018] The connection members 5 and 6 bend a metal plate, are formed in the shape of L character, and are electrically connected to the positive-electrode terminal and negative-electrode terminal of the circuit board, respectively as shown in drawing 3. Moreover, connection projection 6a for inserting in catching hole 4b of the circuit board 4 is prepared in the end of the connection member 6, and it connects with wiring of the circuit board 4 electrically by inserting this connection projection 6a in catching hole 4b, and attaching by soldering etc.

[0019] According to the dc-battery 1 of this operation gestalt, the resin mold section 3 is surrounded by protrusion wall 2b of a battery cell 2 in the perimeter. Consequently, the side face of the resin mold section 3 is not outside exposed, and external force does not join this side face directly. Moreover, since rigid high protrusion wall 2b supports the resin mold section 3, also to the external force which acts on the resin mold section 3 indirectly, the resin mold section 3 can be protected and it can prevent the resin mold section 3 dropping out of a battery cell 2.

[0020] Moreover, since opposite arrangement is carried out on the minimum area front face of a battery cell 2, the circuit board 4 can make the volume of the resin mold section 3 small rather than it is arranged on which other front faces. For this reason, the increment in the volume of a dc-battery 1 is suppressed to the minimum, and small lightweight-ization of a dc-battery 1 can be realized. Furthermore, since there are few amounts of the resin which the resin mold section 3 takes and they end, product cost is reducible.

[0021] Next, the manufacture approach of the dc-battery 1 in this operation gestalt is explained using drawing 9 from drawing 4. In order to manufacture the dc-battery 1 of this operation gestalt, the connection members 5 and 6 are first attached in the inside of protrusion wall 2b of a battery cell 2, and negative-electrode cap 2c by spot welding or soldering, respectively ( drawing 4 ). Subsequently, it is made to slide in from the slanting upper part, and connection terminal 4a and the connection member 5 are connected spot welding or by carrying out soldering so that it may project, the circuit board 4 may be inserted into wall 2b and the inferior surface of tongue of the connection member 5 which projected and projected the connection terminal 4a from wall 2b may be touched. Furthermore, after inserting connection projection 6a in catching hole 4b of the circuit board 4, the connection member 6 is connected to a catching hole 4b part by spot welding or soldering ( drawing 5 ).

[0022] Thus, where the circuit board 4 is connected to each terminal of a battery cell 2, the resin mold section 3 is fabricated. In order to fabricate the resin mold section 3, as shown in drawing 6, the adjustment catch 11 and the adhesion lid 12 which fix a battery cell 2 are used. An adjustment catch 11 is a container made from an aluminium alloy, and has hold section 11a for supporting so that said battery cell 2 may not fall. This hold section 11a is in the condition of having made the opening tip of a battery cell 2 projecting, and has the volume of extent which holds a battery cell 2.

[0023] The adhesion lid 12 is a lid-like member made from an aluminium alloy, and as shown in drawing 9, it is equipped with insulating member 12a and injection nozzle 12b. Insulating member 12a is a member for preventing the electric short circuit by the external connection terminal and protrusion wall 2b of a connector 7 contacting the adhesion lid 12, and is prepared in the field which the edge of a connector 7 and protrusion wall 2b sticks among the front faces of the adhesion lid 12. Injection nozzle 12b is prepared in the interior of the adhesion lid 12. Moreover, the exit hole of injection nozzle 12b is established in the center section of the field in which insulating member 12a is installed.

[0024] Said battery cell 2 is held in hold section 11a of an adjustment catch 11 as shown in drawing 7. And as shown in drawing 8 and drawing 9, the adhesion lid 12 is stuck for the external connection terminal of the edge of protrusion wall 2b of a battery cell 2, and a connector 7. Thereby, the cavity closed with obturation plate 2a, protrusion wall 2b, and the adhesion lid 12 is formed. In this condition, melting resin is injected toward the inside of this cavity from injection nozzle 12b. If it fills up with melting resin in a cavity, in order for the heat of melting resin to project immediately and to conduct to a wall etc., it is cooled quickly and the melting resin in a cavity is hardened.

[0025] Thereby, the dc-battery 1 which has the resin mold section 3 which wrapped in the circuit board 4 is manufactured by the hollow surrounded by protrusion wall 2b of a battery cell 2. The adhesion lid 12 is separated from a dc-battery 1 next, and a production process is completed by picking out a dc-battery 1 from an adjustment catch 11. With this dc-battery 1, since the adhesion lid 12 had stuck during manufacture at the connector 7, only the end face of a connector 7 is exposed to the front face of the resin mold section 3 of a dc-battery 1.

[0026] According to the manufacture approach of the dc-battery 1 of the above-mentioned operation gestalt, since obturation plate 2a of a battery cell 2 and protrusion wall 2b are used for demarcation of a cavity, there is an advantage that it is not necessary to use the metal mold which has a complicated cavity configuration.

[0027] In addition, although the positive electrode and the negative-electrode terminal are arranged with

the dc-battery 1 of said operation gestalt for the external connection terminal of the connector 7 for connecting with a personal digital assistant, while preparing the negative-electrode terminal area which projects from the front face of the resin mold section 3 instead of a connector 7, the whole front face of a battery cell 2 may be operated as a positive-electrode terminal. Thus, by a negative-electrode terminal and a positive-electrode terminal being mutually prepared in the field of the opposite side of a dc-battery, as a dc-battery puts each of that terminal, a personal digital assistant can be equipped with it. Moreover, although it projected to the perimeter of obturation plate 2a of a battery cell 2 over the perimeter and wall 2b was prepared in it, it may project only in a part of perimeter of obturation plate 2a, or the location which counters on both sides of obturation plate 2a, and wall 2b may be prepared.

[0028] Moreover, what is necessary is to have used the adhesion lid 12 which demarcates only the whole surface of a cavity by the manufacture approach of the dc-battery 1 of said operation gestalt, since protrusion wall 2b was prepared in the perimeter of obturation plate 2a over the perimeter, but just to use the metal mold which can demarcate cavity sides other than the cavity side by this protrusion wall 2b, when protrusion wall 2b is prepared only in the part in around obturation plate 2a. Moreover, although the front face of the adhesion lid 12 which touches the external connection terminal of a connector 7 is equipped with insulating member 12a, an insulating member may be directly stuck on an external connection terminal.

[0029]

[Effect of the Invention] This invention has the following effectiveness so that clearly from the above explanation. While according to invention concerning claim 1 the side face of the resin mold section projects and being supported by the wall, the adhesion area of a battery cell and the resin mold section increases, and since possibility that the resin mold section will drop out of a battery cell can be reduced, the soundness of a dc-battery can be held.

[0030] While supporting resin mold to the external force which acts in the opposite direction of these protrusion wall according to invention concerning claim 2, it can project with the resin mold section also to the external force of the direction which intersects perpendicularly with this, adhesive strength with a wall can be heightened, and the resin mold section and a battery cell can be fixed still more firmly.

[0031] Since according to invention concerning claim 3 all the side faces of the resin mold section project and it is protected by the wall, it avoids that external force carries out a direct action to this side face, therefore the effectiveness that omission from the battery cell of the resin mold section can be prevented more certainly is done so.

[0032] According to invention concerning claim 4, since the cavity configuration of metal mold can be made simple, the effectiveness that reduction of product cost can be aimed at is done so.

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**TECHNICAL FIELD**

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[Field of the Invention] Especially this invention relates to the technique which improves the dependability and productivity of a dc-battery about the manufacture approach of a dc-battery and a dc-battery.

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#### PRIOR ART

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[Description of the Prior Art] Conventionally, the dc-battery used for personal digital assistants, such as a portable telephone and a personal handy phone machine, is equipped with an abbreviation rectangular parallelepiped-like battery cell and the circuit board electrically connected to each terminal of this battery cell, and there are some which fixed these in one with resin in it.

[0003] Said battery cell is constituted by enclosing with the electrolytic solution what carried out two or more layer laminating of the positive-electrode film separated with the separator in the container which comes to carry out deep drawing of the aluminum material, and the negative-electrode film with an obturation plate. To this obturation plate, a negative-electrode terminal projects in that center, and it is arranged at the condition.

[0004] Said circuit board is a thing for charge control of a battery cell, and electrical protection, and is pasted up on the front face of said battery cell with the double-sided tape. In order to prevent that the thickness of a dc-battery increases the adhesion location to the battery cell of the circuit board, while considering as the side face in which it meets in the thickness direction of a battery cell, in order to secure sufficient adhesion area by the double-sided tape, the flat side face is chosen. Moreover, the circuit board is attached in the side face contiguous to a negative-electrode terminal from the need of connecting with the negative-electrode terminal which projects on one side face of a battery cell.

[0005] Furthermore, the circuit board is connected to each terminal of a battery cell by the metal connection plate. This connection plate is prolonged toward the adjoining negative-electrode terminal and adjoining positive-electrode terminal of a side face, respectively from the both ends of the long and slender circuit board allotted covering the overall length of a battery cell, and connects the circuit board and a battery cell electrically and mechanically by carrying out soldering of each tip to each terminal. Therefore, these connection plate will be arranged so that said battery cell may be held. And the circuit board and the connection plate which were fixed in this way are wrapped in by the resin mold section, and are united with the battery cell.

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## EFFECT OF THE INVENTION

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[Effect of the Invention] This invention has the following effectiveness so that clearly from the above explanation. While according to invention concerning claim 1 the side face of the resin mold section projects and being supported by the wall, the adhesion area of a battery cell and the resin mold section increases, and since possibility that the resin mold section will drop out of a battery cell can be reduced, the soundness of a dc-battery can be held.

[0030] While supporting resin mold to the external force which acts in the opposite direction of these protrusion wall according to invention concerning claim 2, it can project with the resin mold section also to the external force of the direction which intersects perpendicularly with this, adhesive strength with a wall can be heightened, and the resin mold section and a battery cell can be fixed still more firmly.

[0031] Since according to invention concerning claim 3 all the side faces of the resin mold section project and it is protected by the wall, it avoids that external force carries out a direct action to this side face, therefore the effectiveness that omission from the battery cell of the resin mold section can be prevented more certainly is done so.

[0032] According to invention concerning claim 4, since the cavity configuration of metal mold can be made simple, the effectiveness that reduction of product cost can be aimed at is done so.

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#### TECHNICAL PROBLEM

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[Problem(s) to be Solved by the Invention] However, with the conventional dc-battery constituted in this way, since the circuit board and a connection plate were arranged on the side face of a battery cell, the front face of a battery cell will be covered with the circuit board or a connection plate, and there was a problem that adhesion area with the resin mold section decreased. For this reason, the resin mold section may drop out according to external force. Moreover, since the resin mold section was fabricated covering three side faces of a battery cell, the battery cell needed to be made buried in the interior of metal mold, and the resin mold section needed to be fabricated. For this reason, the metal mold which has a complicated cavity configuration was used, and there was a problem that the product cost of a dc-battery became high. This invention is made in view of the situation mentioned above, and aims at improvement in the dependability of a dc-battery, and productivity.

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## MEANS

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[Means for Solving the Problem] Invention which relates to claim 1 in order to solve the above-mentioned technical problem is a dc-battery which comes to unify a battery cell and the circuit board electrically connected to each terminal of this battery cell by the resin mold section which wraps in this circuit board , and has proposed the dc-battery which made some walls [ at least ] of the container which constitutes a battery cell project from one adjoining front face which adjoins this wall and which it projected and the resin mold section has stuck to the wall .

[0008] According to this invention, the adhesion area of a battery cell and the resin mold section can be made to increase, when the front face of a battery cell and the inside of a protrusion wall paste the resin mold section. Moreover, a rigid high protrusion wall can be made to support the side face of the resin mold section. Consequently, the adhesive strength of a battery cell and the resin mold section is increased, and it becomes possible to hold so that the resin mold section's dedropping [ a battery cell to ] may not be found in the resin mold section from the side to this external force.

[0009] Moreover, invention concerning claim 2 has proposed the dc-battery formed in the location where said protrusion wall counters across said adjoining front face two places in a dc-battery according to claim 1. According to this invention, while supporting the resin mold section to the external force applied in the opposite direction of these protrusion wall, the resin mold section inserted into two protrusion walls which counter can project with the resin mold section also to the external force of the direction which intersects perpendicularly with this, can heighten adhesive strength with a wall, and can improve further the installation reinforcement of the resin mold section and a battery cell.

[0010] Moreover, invention concerning claim 3 has proposed the dc-battery with which said protrusion wall is prepared in the perimeter on said front face of adjoining over the perimeter in a dc-battery according to claim 1 or 2. According to this invention, it can project, the side face of the resin mold section can be covered with a wall over the perimeter, and it can prevent that external force joins this side face directly.

[0011] Moreover, invention concerning claim 4 is the manufacture approach of a dc-battery given in either of claim 1 to claims 3, and has proposed the manufacture approach of a dc-battery of pouring in and stiffening melting resin in the cavity which is in the condition electrically connected to each terminal of said battery cell, and demarcated said circuit board around the circuit board using said adjoining front face and said protrusion wall.

[0012] According to this invention, by demarcating a cavity using a protrusion wall, the cavity side formed by metal mold can be lessened, and metal mold can be made simple. Especially the cavity side that should be formed with metal mold if it projects over the perimeter on the front face of adjoining and a wall is formed is set to one, and the metal mold of a simple configuration like the lid which closes tip opening of a protrusion wall can be used instead of the metal mold which wraps in a battery cell.

[0013]

[Embodiment of the Invention] Hereafter, 1 operation gestalt of the dc-battery concerning this invention is explained with reference to drawing 9 from drawing 1 . Drawing 1 is the perspective view showing the appearance of the dc-battery 1 concerning this operation gestalt. A dc-battery 1 is used for personal digital assistants, such as a portable telephone, and is constituted by a battery cell 2 and the resin mold section 3.

[0014] A battery cell 2 is for example, a lithium ion dc-battery, and as shown in drawing 2 , it has the container of the shape of a rectangular parallelepiped made from aluminum and obturation plate 2a by which deep-drawing shaping was carried out. The separator and electrode which are not illustrated are enclosed with the interior of said container with the electrolytic solution. Said obturation plate 2a is a lid-like member for sealing opening of this container.

[0015] It projects in the center section of obturation plate 2a from the front face of this obturation plate 2a, and negative-electrode cap 2c is prepared in it. Negative-electrode cap 2c is electrically insulated to obturation plate 2a. Said obturation plate 2a constitutes one on the front face of a minimum area where projected area is the smallest of the front faces of a battery cell 2.

[0016] Obturation plate 2a was inserted from the opening tip of a container to the location of the predetermined depth, and has sealed the container by carrying out a girth weld to a container there. That is, obturation plate 2a constitutes the adjoining front face which adjoins the container wall surface of a battery cell, and constitutes protrusion wall 2b in which the part from obturation plate 2a to an opening tip projects from an adjoining front face among container side attachment walls. Thus, in the constituted battery cell 2, all the other front faces where negative-electrode cap 2c contained obturation plate 2a and protrusion wall 2b as a negative-electrode terminal function as a positive-electrode terminal, respectively.

[0017] Said resin mold section 3 has wrapped in the circuit board 4 and the connection members 5 and 6, as shown in drawing 2. The circuit board 4 has the area of extent with which the magnitude of obturation plate 2a of a battery cell 2 is not filled, and carries suitable electronic parts and the connector 7 grade for external connection. These electronic parts are components for performing charge control of a dc-battery 1 etc. Said circuit board 4 is connected to a battery cell 2 through the connection members 5 and 6 while it counters obturation plate 2a of a battery cell 2 and is arranged. Connection terminal 4a and catching hole 4b as shown in drawing 3 are prepared in the circuit board 4. Wiring (illustration abbreviation) led from said connector 7 grade is connected to connection terminal 4a and catching hole 4b.

[0018] The connection members 5 and 6 bend a metal plate, are formed in the shape of L character, and are electrically connected to the positive-electrode terminal and negative-electrode terminal of the circuit board, respectively as shown in drawing 3. Moreover, connection projection 6a for inserting in catching hole 4b of the circuit board 4 is prepared in the end of the connection member 6, and it connects with wiring of the circuit board 4 electrically by inserting this connection projection 6a in catching hole 4b, and attaching by soldering etc.

[0019] According to the dc-battery 1 of this operation gestalt, the resin mold section 3 is surrounded by protrusion wall 2b of a battery cell 2 in the perimeter. Consequently, the side face of the resin mold section 3 is not outside exposed, and external force does not join this side face directly. Moreover, since rigid high protrusion wall 2b supports the resin mold section 3, also to the external force which acts on the resin mold section 3 indirectly, the resin mold section 3 can be protected and it can prevent the resin mold section 3 dropping out of a battery cell 2.

[0020] Moreover, since opposite arrangement is carried out on the minimum area front face of a battery cell 2, the circuit board 4 can make the volume of the resin mold section 3 small rather than it is arranged on which other front faces. For this reason, the increment in the volume of a dc-battery 1 is suppressed to the minimum, and small lightweight-ization of a dc-battery 1 can be realized. Furthermore, since there are few amounts of the resin which the resin mold section 3 takes and they end, product cost is reducible.

[0021] Next, the manufacture approach of the dc-battery 1 in this operation gestalt is explained using drawing 9 from drawing 4. In order to manufacture the dc-battery 1 of this operation gestalt, the connection members 5 and 6 are first attached in the inside of protrusion wall 2b of a battery cell 2, and negative-electrode cap 2c by spot welding or soldering, respectively ( drawing 4 ). Subsequently, it is made to slide in from the slanting upper part, and connection terminal 4a and the connection member 5 are connected spot welding or by carrying out soldering so that it may project, the circuit board 4 may be inserted into wall 2b and the inferior surface of tongue of the connection member 5 which projected and projected the connection terminal 4a from wall 2b may be touched. Furthermore, after inserting connection projection 6a in catching hole 4b of the circuit board 4, the connection member 6 is connected to a catching hole 4b part by spot welding or soldering ( drawing 5 ).

[0022] Thus, where the circuit board 4 is connected to each terminal of a battery cell 2, the resin mold section 3 is fabricated. In order to fabricate the resin mold section 3, as shown in drawing 6, the adjustment catch 11 and the adhesion lid 12 which fix a battery cell 2 are used. An adjustment catch 11 is a container made from an aluminium alloy, and has hold section 11a for supporting so that said battery cell 2 may not fall. This hold section 11a is in the condition of having made the opening tip of a battery cell 2 projecting, and has the volume of extent which holds a battery cell 2.

[0023] The adhesion lid 12 is a lid-like member made from an aluminium alloy, and as shown in drawing 9, it is equipped with insulating member 12a and injection nozzle 12b. Insulating member 12a is a member for preventing the electric short circuit by the external connection terminal and protrusion wall 2b of a connector 7 contacting the adhesion lid 12, and is prepared in the field which the edge of a connector 7 and protrusion wall 2b sticks among the front faces of the adhesion lid 12. Injection nozzle 12b is prepared in the interior of the adhesion lid 12. Moreover, the exit hole of injection nozzle 12b is established in the center section of the field in which insulating member 12a is installed.

[0024] Said battery cell 2 is held in hold section 11a of an adjustment catch 11 as shown in drawing 7. And as shown in drawing 8 and drawing 9, the adhesion lid 12 is stuck for the external connection terminal of the edge of protrusion wall 2b of a battery cell 2, and a connector 7. Thereby, the cavity closed with obturation plate 2a, protrusion wall 2b, and the adhesion lid 12 is formed. In this condition, melting resin is injected toward the inside of this cavity from injection nozzle 12b. If it fills up with melting resin in a cavity, in order for the heat of melting resin to project immediately and to conduct to a wall etc., it is cooled quickly and the melting resin in a cavity is hardened.

[0025] Thereby, the dc-battery 1 which has the resin mold section 3 which wrapped in the circuit board 4 is manufactured by the hollow surrounded by protrusion wall 2b of a battery cell 2. The adhesion lid 12 is separated from a dc-battery 1 next, and a production process is completed by picking out a dc-battery 1 from an adjustment catch 11. With this dc-battery 1, since the adhesion lid 12 had stuck during manufacture at the connector 7, only the end face of a connector 7 is exposed to the front face of the resin mold section 3 of a dc-battery 1.

[0026] According to the manufacture approach of the dc-battery 1 of the above-mentioned operation gestalt, since obturation plate 2a of a battery cell 2 and protrusion wall 2b are used for demarcation of a cavity, there is an advantage that it is not necessary to use the metal mold which has a complicated cavity configuration.

[0027] In addition, although the positive electrode and the negative-electrode terminal are arranged with the dc-battery 1 of said operation gestalt for the external connection terminal of the connector 7 for connecting with a personal digital assistant, while preparing the negative-electrode terminal area which projects from the front face of the resin mold section 3 instead of a connector 7, the whole front face of a battery cell 2 may be operated as a positive-electrode terminal. Thus, by a negative-electrode terminal and a positive-electrode terminal being mutually prepared in the field of the opposite side of a dc-battery, as a dc-battery puts each of that terminal, a personal digital assistant can be equipped with it. Moreover, although it projected to the perimeter of obturation plate 2a of a battery cell 2 over the perimeter and wall 2b was prepared in it, it may project only in a part of perimeter of obturation plate 2a, or the location which counters on both sides of obturation plate 2a, and wall 2b may be prepared.

[0028] Moreover, what is necessary is to have used the adhesion lid 12 which demarcates only the whole surface of a cavity by the manufacture approach of the dc-battery 1 of said operation gestalt, since protrusion wall 2b was prepared in the perimeter of obturation plate 2a over the perimeter, but just to use the metal mold which can demarcate cavity sides other than the cavity side by this protrusion wall 2b, when protrusion wall 2b is prepared only in the part in around obturation plate 2a. Moreover, although the front face of the adhesion lid 12 which touches the external connection terminal of a connector 7 is equipped with insulating member 12a, an insulating member may be directly stuck on an external connection terminal.

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[Translation done.]

## \* NOTICES \*

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## DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] It is the perspective view showing the dc-battery concerning 1 operation gestalt of this invention.

[Drawing 2] It is the sectional view of the dc-battery of drawing 1.

[Drawing 3] It is the decomposition perspective view having decomposed and shown the resin mold section of the dc-battery of drawing 1.

[Drawing 4] It is the perspective view showing the setting-up procedure of the dc-battery of drawing 1.

[Drawing 5] It is the perspective view showing the condition before resin mold section shaping of the dc-battery of drawing 1.

[Drawing 6] It is the perspective view showing the manufacture process which fabricates the resin mold section of the dc-battery of drawing 1.

[Drawing 7] It is the perspective view showing the manufacture process which fabricates the resin mold section of the dc-battery of drawing 1.

[Drawing 8] It is the perspective view showing the manufacture process which fabricates the resin mold section of the dc-battery of drawing 1.

[Drawing 9] It is the sectional view showing the manufacture process which fabricates the resin mold section of the dc-battery of drawing 1.

[Description of Notations]

1 Dc-battery

2 Battery Cell

2a Adjoining front face

2b Protrusion wall

3 Resin Mold Section

4 Circuit Board

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[Translation done.]

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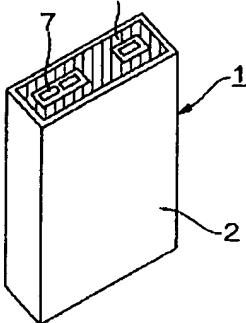
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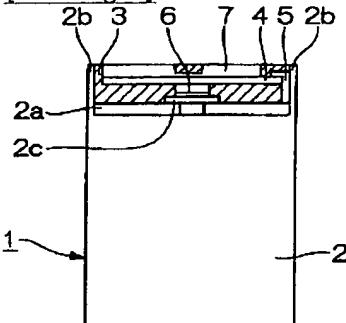
DRAWINGS

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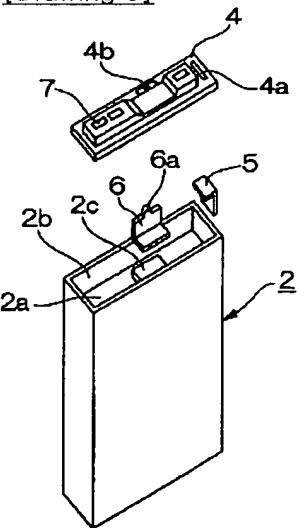
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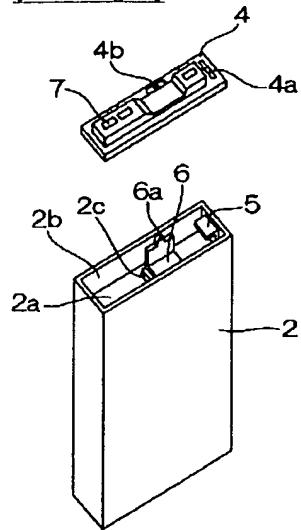
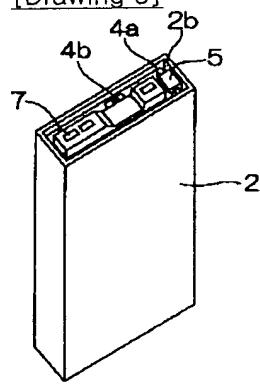


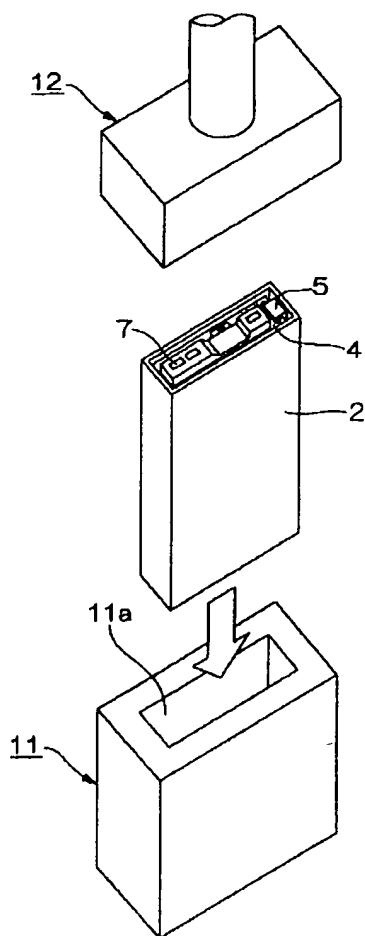
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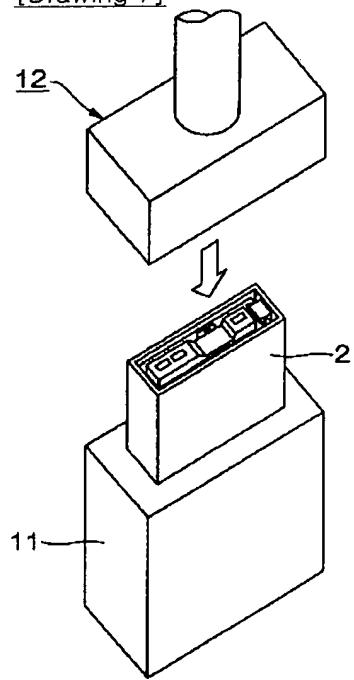
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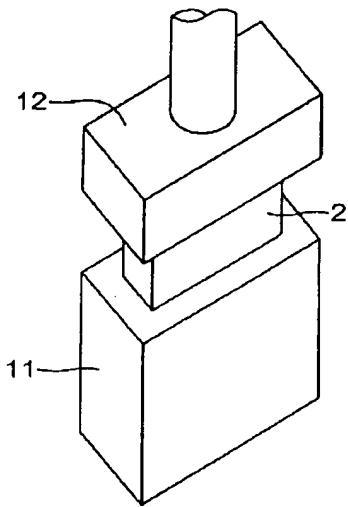
[Drawing 4][Drawing 5][Drawing 6]



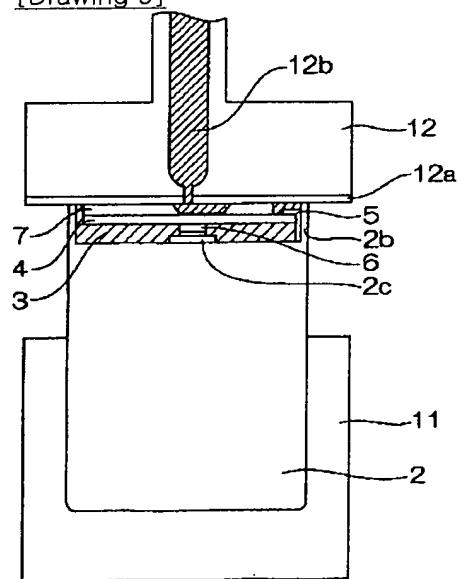
[Drawing 7]



[Drawing 8]



[Drawing 9]



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[Translation done.]